User Manual

SR250*i*....LAN+

No-Break™ DC UPS - with Ethernet port *(SNMP - firmware va11)*
250W

Z367

2 x **SR250** fitted in 2U rack

Please refer to separate user manual for full SNMP instructions

08/06/15

Safety

The user is responsible for ensuring that input and output wiring segregation complies with local standards and that in the use of the equipment, access is confined to operators and service personnel. A low resistance earth connection is essential to ensure safety and additionally, satisfactory EMI suppression (see below).

HAZARDOUS VOLTAGES EXIST WITHIN A POWER SUPPLY ENCLOSURE AND ANY REPAIRS MUST BE CARRIED OUT BY A QUALIFIED SERVICEPERSON.

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Electrical Strength Tests

Components within the power supply responsible for providing the safety barrier between input and output are constructed to provide electrical isolation as required by the relevant standard. However EMI filtering components could be damaged as result of excessively long high voltage tests between input, output and ground. Please contact our technicians for advice regarding electric strength tests.

Earth Leakage

Where fitted, EMI suppression circuits cause earth leakage currents which may be to a maximum of 3.5mA.

Ventilation

High operating temperature is a major cause of power supply failures, for example, a 10°C rise in the operating temperature of a component will halve its expected life. Therefore always ensure that there is adequate ventilation for the equipment. Batteries in particular suffer shortened lifetimes if subjected to high ambient temperatures.

Water / Dust

Every effort must be made in the installation to minimise the risk of ingress of water or dust. Water will almost always cause instant failure. The effects of dust are slower in causing failure of electronic equipment but all electrical equipment should be cleaned free of any dust accumulation at regular intervals.

Electromagnetic Interference (EMI)

Switching power supplies and converters inherently generate electrical noise. All wiring should be as short as practicable and segregated from all equipment wiring which is sensitive to EMI. Residual noise can be reduced by looping DC wiring through ferrite cores (sleeves). These are most effective as close to the power supply as possible and as many turns of the wire taken through the core (+ and - in the same direction) as the core will accommodate.

External fuse protection

Fuses or circuit breakers must be used in all battery circuits to protect against short circuits. External fuses should be used for power supplies/ chargers even though they are usually internally protected.

Connection polarity

It is critical to check the polarity carefully when connecting DC devices. Some Innovative Energies models have non-destructive reverse polarity protection but usually a reverse polarity connection will result in a blown fuse or serious damage to the device.

Glossary of terms used in our user manuals

PSU = power supply unit

BCT = battery condition test

ECB = electronic circuit breaker

ELVD = electronic low voltage disconnect

RPP = reverse polarity protection

EMI = electromagnetic interference

SNMP = Simple Network Management Protocol

LAN = local area network

DOD = depth of discharge

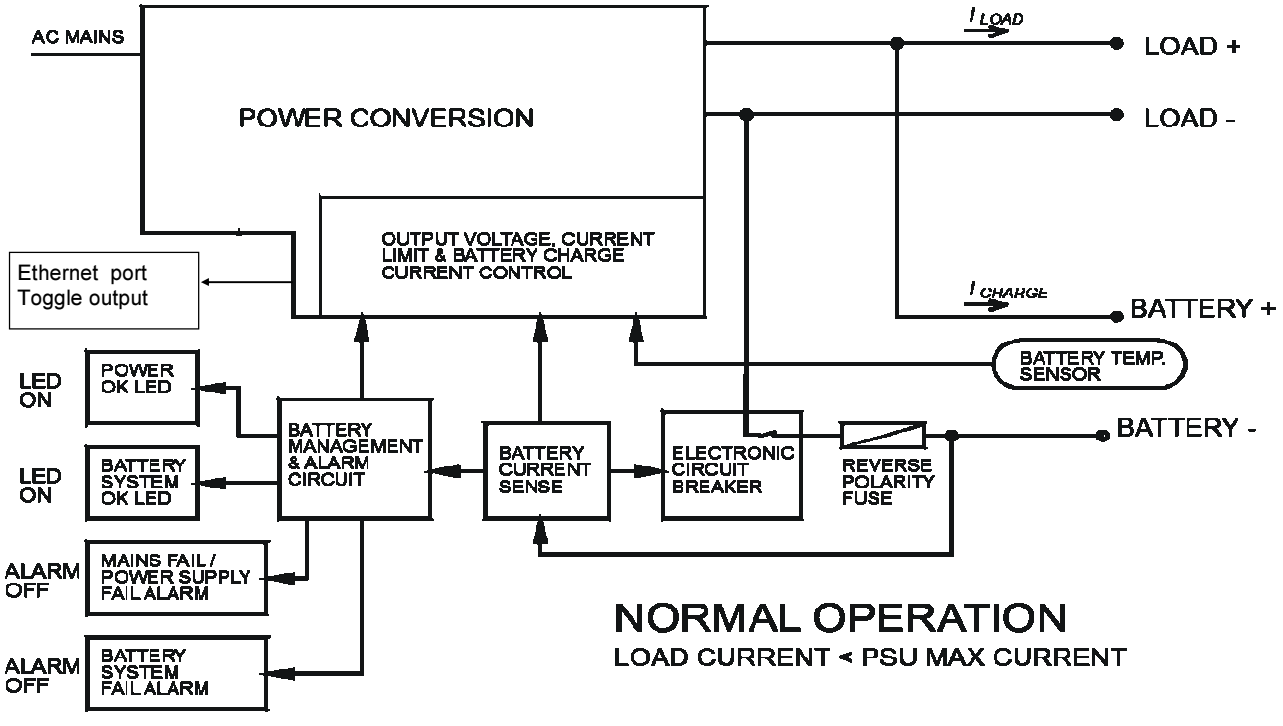
Introduction

The ***No-Break™ DC*** power supply is designed to provide DC power to lead acid batteries for critical back up applications. This user manual refers to the **SR250*i*** version with an Ethernet port configured with SNMP network monitoring protocol. Note that some of the more general information contained in this manual refers to other models in the ***No-Break™ DC*** range

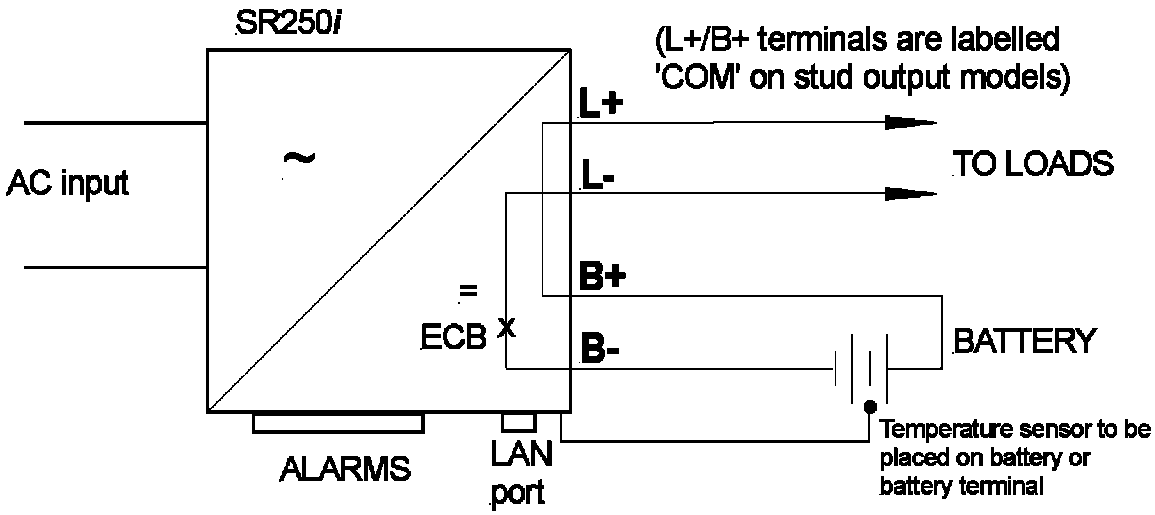
Features include:

- Monitoring of the battery status and availability at all times
- Monitoring of input power status
- Continuous monitoring of power supply voltage, battery voltage on mains failure or during BCT, power supply and battery currents
- Battery overcurrent protection and reverse polarity connection, using an electronic circuit breaker (ECB). With input (mains) power present, the ECB acts to limit the battery current but does not latch open. If no mains power is present then the ECB will latch open on battery circuit overcurrent.
- Deep discharge protection by disconnecting the load at low battery voltage.
- Monitoring of ambient temperature (usually temperature near batteries) using external temperature sensor
- Temperature compensation of battery charge voltage - essential for battery health where ambient temperatures fluctuate.
- Alarm contacts to enable interfacing with monitoring equipment such as PLCs, SCADA, security, telemetry
- Battery condition test (BCT) at preset intervals or as determined by the user.
- Adjustable battery charge current limit
- Monitoring of power supply and network settings
- SNMP traps available for user data logging

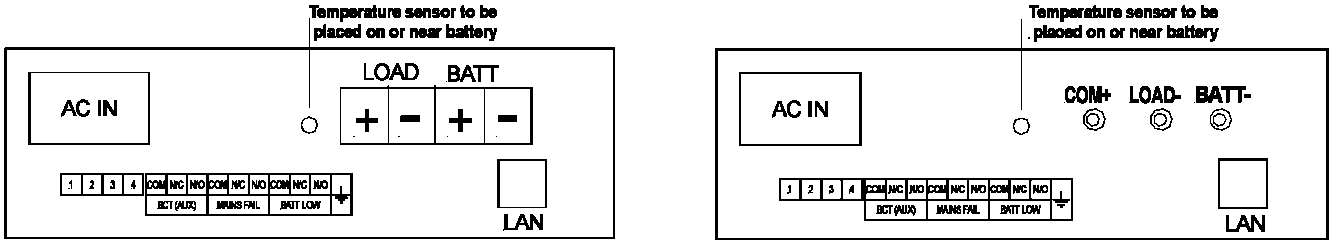
No-Break™ SYSTEM BLOCK DIAGRAM



CONNECTION DIAGRAM



REAR PANEL LAYOUT



Refer to page 7 for description of control terminals 1 - 4.

CONNECTION & INITIAL TESTING

1 Check input and output voltages of system, ensure that they match the equipment. All loads should be isolated.
2 Check polarity of all wiring. Place temperature sensor probe on the batteries or ideally on the battery terminals. Connect the LAN port to the Ethernet network.
3 Plug in ac input and turn power on. Both LEDs will light up after approx. 4 sec, **"BATTERY SYS OK"** LED will go out after another 10 sec (since there is no battery connected). DC output voltage should appear at both load and battery outputs (ensure screws are tightened down on the connector block).
4 Refer to separate instruction sheet for information on SNMP monitoring
5 Turn off input power.
5 Connect battery.
6 Check that ECB (internal electronic circuit breaker) closes by shorting together the **B-** and **L-** terminals briefly. You will hear a relay operate and both LEDs will light up. If this does not happen, there is a fault in the wiring or the internal battery protection fuse is ruptured (see note below). The battery voltage will then appear at the load terminals and the **"BAT LOW"** alarm relay energises. The **"POWER OK"** LED stays on for about 30 seconds.
7 Connect load wiring to **L+** and **L-** terminals.
8 Turn on ac power.
9 After the batteries are fully charged, check that the battery continues to power up the load when the input power is turned off.

NOTE

Reverse polarity protection

If the battery is connected in reverse, the internal battery protection fuse may be ruptured and the unit should be returned to the manufacturer for repair. If the fuse is good, the voltage measured as at step 3 above should be exactly the same on both the load and battery outputs.

FRONT PANEL LEDS (WITH BUILT IN SWITCHES)

BATTERY SYSTEM OK: ***LED on:*** Battery present and above V batl.
Pushing this button briefly will initiate a battery condition test (provided the BCT jumper is fitted, refer to page 7)

POWER OK: ***LED on:*** Charger output present
LED off: no mains input or charger in standby mode

STANDBY: ***LED on:*** Charger in standby mode (no output from charger). Push the **STANDBY** button briefly to put into standby mode.

LED INDICATION CODES

Battery System OK LED	Power OK LED	Stand-by LED	Battery System OK Alarm	Power OK Alarm	Condition
		○	Normal	Normal	System Normal: Input power on, battery circuit is OK
		○	Normal	Normal	Battery detection test in progress
○		○	Alarm	Normal	Input power on, battery system fault: 1. Internal battery fuse has opened ***or*** 2. Battery circuit wiring open circuit, battery missing, ECB has tripped
	○	○	Normal	Alarm	Input power off, battery system is OK (battery volts > Vbatl)
	○	○	Alarm	Alarm	Input power off and battery has discharged to ≤ V batl
○	○	○	Alarm	Alarm	Input power off, ELVD has activated and disconnected battery from load.
		○	Normal	Normal	BCT is in progress: LEDs flash slowly
		○	Alarm	Normal	Input power on, battery condition unserviceable- battery voltage < Vpres during a BCT
			Normal	Normal	PSU in standby, input power on, battery system OK
○	○		Alarm	Alarm	PSU in standby, input power present, battery missing.
			Alarm	Normal	PSU in standby and system has failed previous BCT

LEGEND : =on =fast flash =slow flash ○ =off

ALARM RELAYS

AUX: Relay is energized when BCT is in progress.
MAINS FAIL: Relay is de-energized on loss of mains input power
NOTE: approx. 30 second delay

BAT LOW: Relay is de-energized when either:
1. battery voltage = 1.8V/cell (for 2V cells) - operates only when no mains power present or
2. battery missing or fault in battery circuit wiring (alarm does not show for up to bat tery detection interval time).
3. battery fails a battery condition test (BCT)

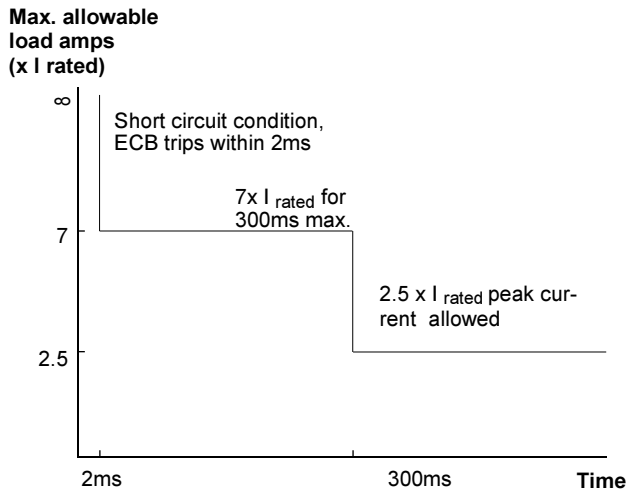
If the system fails a BCT the **BAT LOW** alarm latches (de-energized state) until
either: both the mains power input and the battery are disconnected briefly
or: the system passes the next BCT.

SPECIFICATIONS (at 20 degrees C)

Parameter	Nominal Voltage					Default Value
	12V	24V	30V	36V	48V	
V out = Output Voltage	13.8	27.6	34.5	41.4	55.2	2.3V/cell
V pres = Voltage threshold for battery detection & battery condition test (BCT). If voltage drops to this level during BCT then the test is aborted and **BATT SYS OK** alarm shows	12.2	24.4	30.5	36.6	48.8	2.03V/cell
V shutd = Output voltage of PSU during battery detection & BCT	11.5	23	28.8	34.5	46	1.92V/cell
V batl = voltage where BATT low alarm activates during mains fail	11	22	27.6	33	44	1.84V/cell
V disco = Battery disconnect level on low voltage during mains fail	10	20	25	30	40	1.66V/cell
Bccl = Maximum charge current as % of rated PSU rated current						100% *1
Comms = communications mode of PSU: F = continuous data stream of status M = responds only to request made by a controller						M
BatDetect = Battery detection interval time, active only when no battery charge current is detected (the unit may not detect a missing battery for up to this time)						60 min
BCT = length of battery condition test						20 min
Ret = retest option: N = after a failed BCT further scheduled BCTs are inhibited Y = after a failed BCT further scheduled BCTs will be allowed						Y
CC = Length of charge cycle in minutes/hours/days. ie. time between battery condition tests						40m/23h/ 027d

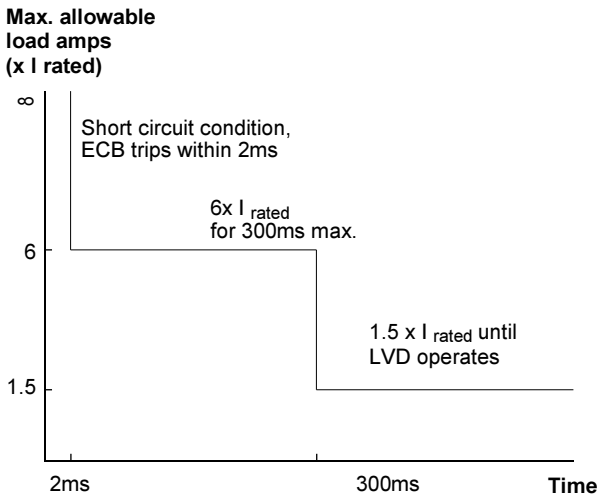
*1 Except for 12V which is set at 50%

OPERATION OF ELECTRONIC CIRCUIT BREAKER (ECB) FOR PROTECTION OF CHARGER & BATTERY



INPUT POWER ON

ECB automatically resets



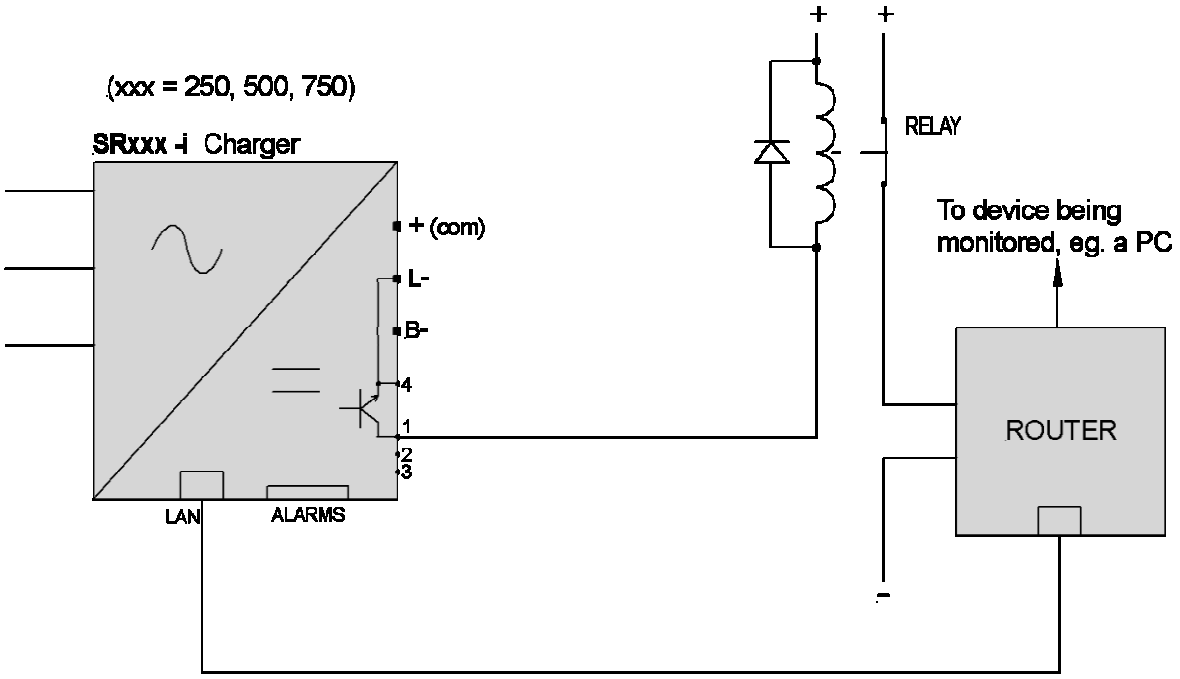
INPUT POWER OFF

ECB trips & latches off until input power is restored

The ECB, which is between the load and battery negatives (**L-/B-)** operates to protect the charger on over-current, and to protect the battery from deep discharge (LVD) when there is no mains power present. When input power is present the ECB resets automatically but when the input power is off the ECB will not reset until power is restored. For testing purposes when there is no power present the ECB can reset by briefly shorting the **B-** and **L-** terminals together.

OPTIONAL CONTROL TERMINALS

Terminals 1-4 on the alarm terminal connector block are used for BCT control and LAN supervision which is described below.



TERMINAL LAYOUT

OPTIONAL
1: LAN supervision output (LAN+ versions)
2: BCT interlock signal
3: Start/stop BCT using closed contact signal for 0.5s between 3 & 4
4: connected to L-

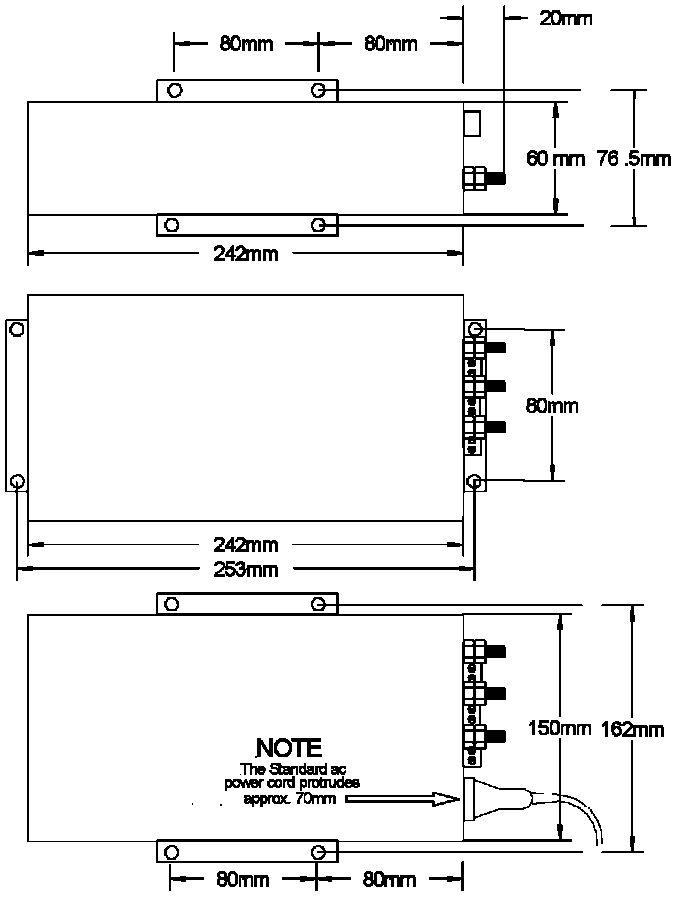
LAN SUPERVISION

The **SR250 - i - LAN+** PSU/charger has a transistor collector output, labelled terminal '1', which is controlled via the SNMP software and, for example, may be used to reboot a modem/router. The output is switched on ('low' state) for approx. 5 sec if the selected LAN device (eg. the monitoring PC) fails to respond to 'ping' echo requests for a time longer than the configured timeout (default setting is 2 minutes). Further relay toggles will take place every twice the timeout (4 minutes) until the device responds. Once the device under supervision responds a SNMP trap will be sent by the **SR250-i** to indicate that the device has been successfully rebooted.

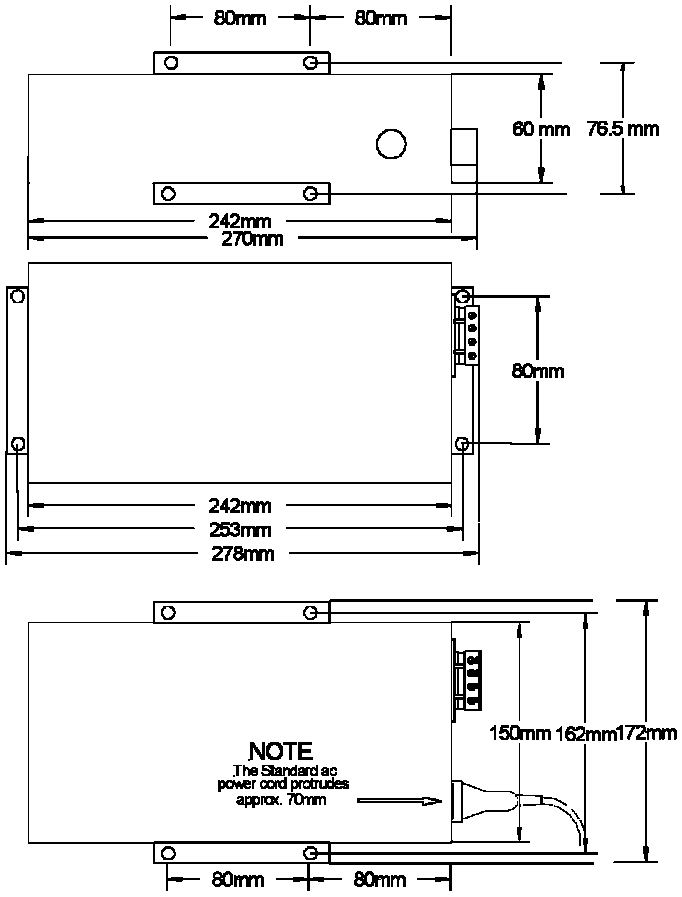
The configuration of this feature is done via the **'LAN Supervision Configuration'** web page (refer to page 17 of the SNMP user manual).

MOUNTING DETAILS FOR SR250

STUD OUTPUT



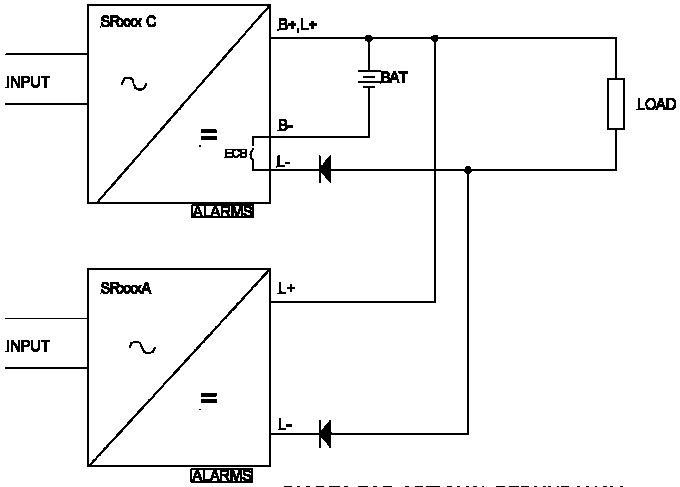
SCREW TERMINAL OUTPUT



SOME TYPICAL NO-BREAK DC CONNECTIONS

#1 *No-Break™DC* charger with additional PSU

The second PSU is used primarily to provide extra charging current.

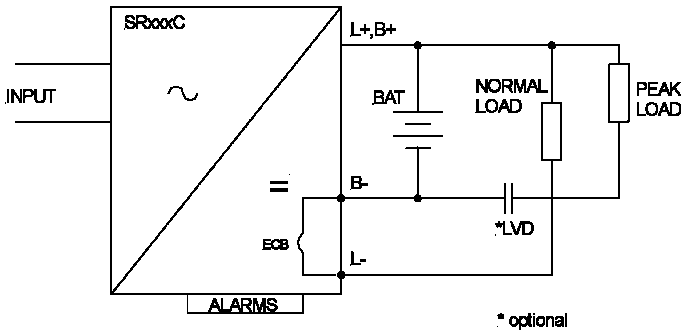


DIODES FOR OPTIONAL REDUNDANCY

Alarms available	
Power OK	YES
Battery missing	NO
Battery low	YES
Battery condition test fail	YES

#2 *No-Break™DC* Connection for high peak loads

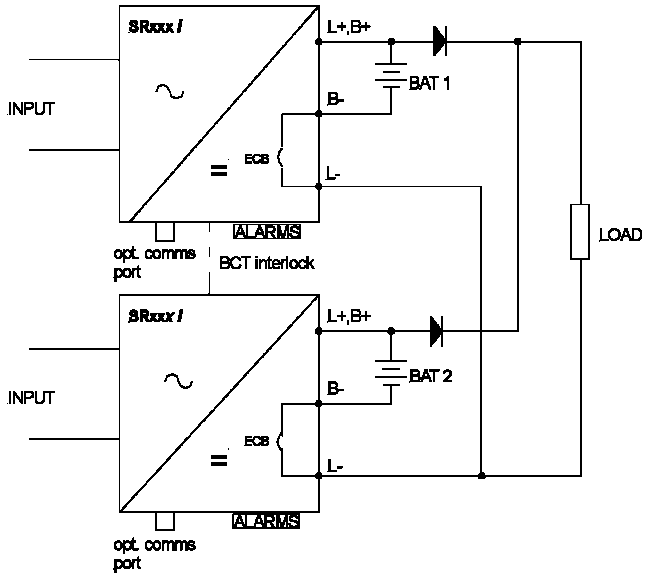
This is a basic connection which is used when there is a connected load with a peak current greater than 1.5 times the rated current of the charger. Standing loads are connected normally and an optional external low voltage disconnect may be used for the peak load.



Alarms Available	
Power OK	YES
Battery Missing	YES
Battery Low	YES
Battery Condition Test Fail	YES

#3 2 x *No-Break™DC* chargers and 2 x battery banks for redundancy

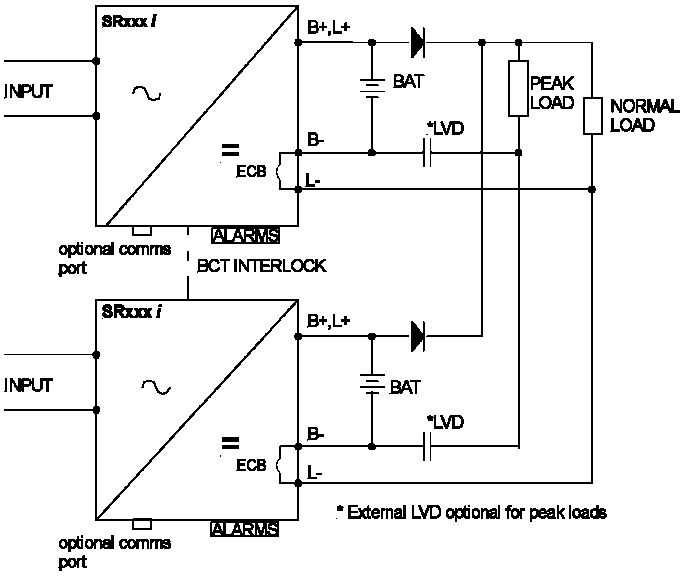
The diodes isolate the units from one another in the event of a short circuit appearing at the other output and aid current sharing.



Alarms Available	
Power OK	YES
Battery Missing	YES
Battery Low	YES
Battery Condition Test Fail	YES

#4 2 x *No-Break™DC* charger and 2 x battery banks- for redundancy and high peak loads

All *No-Break* alarms are available and the low voltage disconnect for the peak load is optionally implemented with an external relay.



Alarms available	
Power OK	YES
Battery missing	YES
Battery low	YES
Battery condition test fail	YES

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SR250i

250W PSU/Charger with communication options

- **High performance *No-Break™ DC* UPS system**
- **Choice of Ethernet/RS485/RS232 output**
- **Separate outputs for load and battery**
- **Battery detection - regular battery presence and battery circuit integrity checks**
- **Deep discharge protection for batteries**
- **Battery condition test (BCT) automatic or user controlled via comms. port**
- **Overload, short circuit & reverse polarity protection for battery**
- **Temperature compensated output**
- **No transition switching between PSU & battery**
- **LED flash codes for precise state indication**
- **"Mains" & "Battery System" alarm relay outputs**
- **LAN supervision output for Ethernet versions**

♦ 24 Month Warranty

SPECIFICATIONS All specifications are typical at nominal input, full load and at 20°C unless otherwise stated.

ELECTRICAL

Input Voltages	
▪ standard	180V - 264V, 45-65Hz
▪ optional	88V - 132VAC (internal link select) 88-135VDC (specify at time of order)
Fusing / Protection	Internal input fuse, output battery fuse
Isolation	1KV DC input - output / earth
Efficiency	≥ 85%
Inrush current	Soft start circuit
Output Power	250W continuous (0 - 50°C)
Output Voltages	13.8/ 27.6/ 34.5/ 41.4/ 55.2V
Voltage adj. range	85 - 105% of Vout
Temp. Compensation	Temperature sensor on 1.7m lead with adhesive pad: -4mV / °C / cell ±10%
Current Limit	Straight line profile
Line Regulation	<0.2% over AC input range
Load Regulation	<0.4% open circuit to 100% load
Noise	<1% of rated output
Drift	0.03% / °C
Hold-up time	15 - 20 ms (nom. - max. Vin) without battery
Thermal Protection	Automatic current de-rating if >50°C. Self-resetting.
Overvoltage protection	Over-voltage protection on output at ~ 130% of nominal output voltage
EMI	CISPR 22 / EN55022 class A
Safety	IEC950 / EN60950 / AS/NZS3260

No-Break™ FUNCTIONS AND ALARMS*

Battery Charge Limit	See Model Table for default settings - may be increased to PSU rated current
Reverse Polarity	Battery reverse connection will open internal fuse (and produce alarm)
Battery Monitoring	Detects for presence of battery on start up, then every 60 minutes when charge current < 200mA
Battery Protection	Electronic Circuit Breaker (ECB) operates under the following conditions:
- battery discharged	ELVD (electronic low voltage disconnect) activates when battery voltage drops to 1.67V/ cell (adjustable) - auto reset
- overload (*refer to options - ECB)	Allows ~150% load from battery without acting, operates within 300ms for total load > 600%
- short circuit	Acts within 2ms, backed up by fuse
Indication LEDs	**Green:** Battery System OK, Power OK **Red:** Standby
Alarms	• Mains Fail (Mains or PSU fail, standby mode) • Battery System OK - alarms when battery voltage low (on mains fail) , battery missing, battery circuit wiring faulty, BCT fail (if enabled)
Alarm Relay contacts	C - NO - NC full changeover rated 1A /50V DC, 32VAC
Battery Condition Test (BCT)	Standard default setting is 20mins/28days BCT may be manually controlled via comms. port.
Standby Mode	Turns off DC output of PSU & allows load to run off battery

ENVIRONMENTAL

Operating temperature	0 - 50 °C ambient at full load De-rate linearly >50 °C to 0 load @ 70 °C
Storage temperature	-10 to 85 °C ambient
Humidity	0 - 95% relative humidity non-condensing
Cooling	Natural Convection except for 12V model

250 Watt
No-Break™ DC charger for lead acid batteries

SR250i

MODEL TABLE

MODELS	DC Output				
	Output (V) 20degC	PSU Rated (A)	Charge Limit (A) *1	Recomm. Load (A)	Peak load (A)*2
SR250*i* 12	13.8	18.0	9.0	12.0	27
SR250*i* 24	27.6	9.0	9.0	5.0	13.5
SR250*i* 30	34.5	7.2	7.2	3.7	10.8
SR250*i* 36	41.4	6.0	6.0	3.0	9
SR250*i* 48	55.2	4.5	4.5	2.0	6.7

***1** Factory default setting unless differently specified at time of ordering

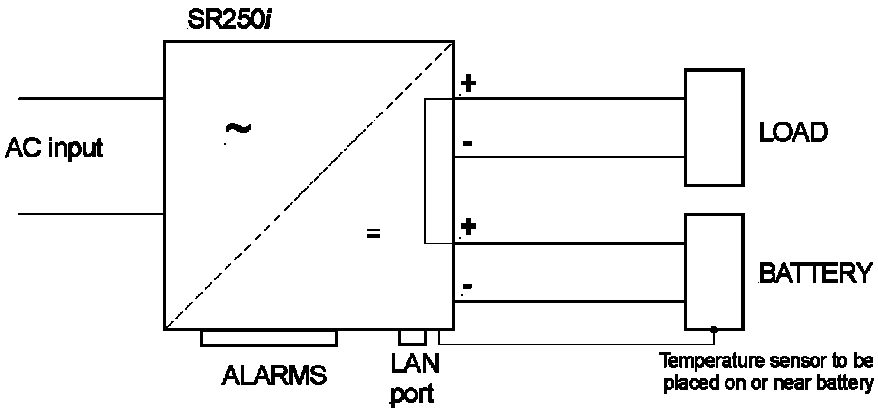
*2 Higher peak loads may be connected directly to the battery and bypassing the internal overcurrent trip circuit

PHYSICAL DETAILS

AC Input connector	IEC320 input socket (included)
DC Output Connections	M6 brass stud or *'Phoenix combicon'* Plug-in style socket & mating screw terminal block:
Alarm Connections	Plug in screw terminal block
Enclosure	Powder coated or zinc plated steel / anodised aluminium
Weight	1.7kg
Dimensions	242 x 150 x 61mm (excluding mounting feet and connections)
19"Rack Mount	2U sub rack option: add **SR-RM2U** Optional V/I meter for subrack**: SR-METER** Refer to Rack Mounting Option data sheet for further details.

OPTIONS

Battery Condition Test	May be enabled or disabled on start up. **BCT** relay provided to control an external test load or to provide BCT interlock when 2 units are connected for redundancy. Please ask our sales staff for assistance with system design.
Communication Port for *i* versions	Choice of RS485, RS232, Ethernet
+PROTOCONMB-x	Protocol Converter (MODBUS via RS485) with programming port for PC. ***Power MBLink*** setup software supplied. SR250***i:*** -x = blank, x = **-OE** for Ethernet Port
LVD	Low voltage disconnect level may be customized. Please call us for further information.



MODEL IDENTIFICATION CODES

SR250 *i* 12 T F S L-LAN+

Communications Interface Port	**485** = RS485 **232** = RS232 **LAN** = Ethernet **LAN+** = Ethernet/ SNMP
Input voltage and front panel switches	230V AC + switch = **L** 230V AC no switch = blank 110V AC + switch = **U** 110V AC no switch = **G** 110V DC + switch = **H** 110V DC no switch = **J** 230V AC + switch + 300V MOV = **M** (To be used with IE OVP HV AC)
Output DC Connector type:	Stud = **S** Plug in screw terminal block = **X**
Fan cooled:	With fan = **F** No fan = blank
Temperature Compensation	Yes = **T** No = blank
DC output: Nominal voltage	12, 24, 30, 36, 48
Function	***C*** = ***No-Break***™ DC PSU/charger , **M** = **C** with load output at nominal voltage (eg 24V) ***i*** = **C** with communications port & BCT **J** = **C** with **LOAD- & BATT- common** (**Note:** no battery detection function)
Power	250W

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TERMS OF WARRANTY

Innovative Energies Ltd warrants its power supplies for 24 months (two years) from date of shipment against material and workmanship defects.

Innovative Energies' liability under this warranty is limited to the replacement or repair of the defective product as long as the product has not been damaged through misapplication, negligence, or unauthorized modification or repair.

Thank you for purchasing from Innovative Energies.

We trust your power supply will exceed your expectations and perform for years to follow.

Sincerely,
The Innovative Energies team.

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verification
ISO9001 Certified

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